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Larry D. Welch Interview (MORS)

Welch, Larry D.

Military Operations Research Society (MORS) Oral History Project Interview of General Larry D. Welch, US Air Force

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MILITARY OPERATIONS RESEARCH HERITAGE ARTICLE

INTRODUCTION

General Larry D. Welch was the 12th Air Force Chief of Staff. As a field grade officer, he was assigned to Headquarters U.S. Air Force, under the Assistant Chief of Staff for Studies and Analysis. General Welch received the MORS Wanner Award in 1998. He is currently a senior fellow at the Institute for Defense Analyses (IDA) where he was President from 1990 to 2004.

MORS ORAL HISTORY

INTERVIEW WITH GENERAL LARRY D. WELCH
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Alexandria, VA
JIM BEXFIELD, FS, AND BOB SHELDON, FS, INTERVIEWERS

BOB SHELDON: This is the eighth of September 2004, and we're in the offices of IDA to interview General Larry Welch. General Welch, can we begin by describing where you were born and raised?

LARRY WELCH: I was born in a little town called Morning Star, Oklahoma, which no longer exists.

BOB SHELDON: Let me next ask your parents' names and their backgrounds, and how might they have influenced you.

LARRY WELCH: My father was Oliver E. Welch, who died largely as a result of an automobile accident when he was 94. My mother is the former Nina Katherine Stewart. She is 94, still living and doing well. A good part of my early life was in Kansas and Oklahoma during the dust bowl, and the Depression. In order for people to survive those years, you moved around a lot, wherever the breadwinner could find useful work. So up until World War II, we lived in a number of places in western Kansas, the Texas panhandle, Louisiana and Oklahoma. When the war started, the economic situation and the job situation improved markedly. My father went to work in the oil and gas industry. He finally settled down at a natural gas compressor plant in western Kansas until he retired from the oil and gas business. So that's a picture of the earliest life I can recall. I went to a number of schools. For years, I thought I'd become a civil engineer and build bridges. It turned out I didn't build physical bridges, but I spent most of my active-duty career building other kinds of bridges.

BOB SHELDON: Where did you go to high school?

LARRY WELCH: I went to high school in two places: Greensburg, Kansas, a small town of about 1,500 people, and Liberal, Kansas, a town of about 12,000 people. I usually do not tell people I come from a town named Liberal, because then I have to explain why it's called Liberal.

BOB SHELDON: Why is it called Liberal?

LARRY WELCH: It was on the Chisholm Trail. And it was the only place on the Trail that had both plentiful and free water. They were very liberal with their water. They were also very good businessmen because they attracted lots of cattle drives and nothing else was free.

JIM BEXFIELD: Were you involved in special activities in high school? What distinguished your high school career?

LARRY WELCH: Well, I don't know that it was very distinguished, but three things are worth mentioning. One was that I didn't have to work very hard to get straight A's. Consequently, I didn't prepare myself very well for college. Second, since we moved around, I found athletics to be a good entrée at the next place. So I played varsity basketball, football, and ran the 880 in track. I never enjoyed it that much, but if you were a varsity basketball player or football player, you had immediate friends in new places. I was also Yearbook editor. Enjoyed editing—still do. I took as rigorous an academic path as was offered in the local high school. Calculus I, basic physics, and basic chemistry were as far as you could go. But though I went as far as I could go academically, it really wasn't a school oriented at college preparation. I discovered that fact of life my first year in college.

BOB SHELDON: I notice on your resume' it looks chronologically like you joined the Guard before you went to college? Is that correct?

LARRY WELCH: Yes. We had an armored field artillery battery in Liberal—the 161st Armored Field Artillery. It was regarded as a high honor for a young man in high school to be invited to join the Guard battery. And so as I entered my senior year of high school, three of us were invited to join the Guard battery. I think I was invited because I could do basic calculus for fire control.

BOB SHELDON: Did you go through Army basic training first?

LARRY WELCH: No. I went through Guard basic training. It was all local. My Guard battery commander was Captain Dan Lewis, a World War II veteran. In his day job, he was the local pharmacist. The First Sergeant had landed in Normandy

and was the Senior NCO in the battery. Both were extraordinarily good leaders and trainers. It was a very competent battery, equipped with three 105mm howitzers mounted on armored vehicles. We went to Guard camp each summer for three weeks, and demonstrated that we met the federal standards. It was serious business. But it was also a social honor in Liberal to be in the Guard battery.

BOB SHELDON: Was this during high school?

LARRY WELCH: I was a senior in high school. My first semester in college, I decided I did not want to be a civil engineer, since I hated engineering drawing. We didn't have CAD [computer-aided design] then, or I might have become a civil engineer. We did engineering drawings on the drawing board. So I went to Houston to the University of Houston to study geology. I discovered I didn't like geology much either. I transferred from the Kansas to the Texas Guard but soon became aware that I was spinning my wheels. I really didn't know what I wanted to do. The draft board was going to be breathing down my neck soon. So I went down and took the aptitude test to enlist. After I took the test, the Army and the Air Force guys were each trying to persuade me to come to them. That was flattering, but I'd been in the Army Guard and they had pegged my fun meter. So, with the choice of a two-year enlistment in the Army or a three-year enlistment in the Air Force, I chose the Air Force. I finished that enlistment 38 years later.

BOB SHELDON: It took you a while.

LARRY WELCH: Well, I started as an Airman Basic with no college degree, so I guess I had lots of room to grow.

BOB SHELDON: What was your initial career field or training in the Air Force?

LARRY WELCH: I had initially elected to be an electronics technician. But while I was waiting to go to tech school at Lowry, I served as an assistant tactical instructor (T.I.), which meant I was a one-striper helping a four-striper take care of 90 new basic trainees in a course I had just finished. One day I took my 90-man group over to the base theater where they were briefed on the aviation cadet program. I was standing in the back with a lot of other bored T.I.'s when some guy came back and handed me a card and said, "You want to fill one of these out?" And I said, "Sure, I'll fill it out." I did and threw it in the basket. A week later I got this urgent call from the orderly room. I had pretty much forgotten about the card. At the time a three-striper was considered king of the hill. A captain was God. So when the call came in, a three-striper came to get me and said, "There's a Captain Lewis waiting for you on the phone." Captain Lewis said, "Is this Welch?" And I said, "Yes, sir." And he said, "We've looked over your test record, and we think you are a good candidate for the aviation cadet program. Are you interested?" As I paused, he laughed and he said, "You don't know what I'm talking about, do you?" And I said, "Well, no sir." He said, "Well, let me tell you what, Welch. Come over here for a week. You'll take some tests. You'll wear civilian clothes. You spend the nights here and you're off every night." That sounded good, so I went over, took all the tests, finished the tests, and he said, "Well, you're a nine seven for officer, and a nine six for pilot, and a nine three for navigator. What do you want to do?" Do you want to be a pilot or a navigator? I looked at him and I said, "I want to be a pilot." And that was it. So you can see that I had a carefully planned career.

But my expectation continued to be that I would serve three years and then go on with my life—back to school to finish a degree. By then I thought I'd grown up enough to figure out what I really wanted to do. But as it turned out, each time we came to a decision point, Eunice and I would look at it and say, "Well, we like what we're doing."

BOB SHELDON: Were you married when you were an aviation cadet?

LARRY WELCH: No. Cadets weren't allowed to be married. Eunice and I were married a year after I was commissioned. We had dated a bit in high school by the way.

BOB SHELDON: As an aviation cadet, what was the program like?

LARRY WELCH: The Aviation Cadet program started with what was called "Pre-flight." That lasted thirteen weeks, and it was all officers training. It was essentially the same as Officer Candidate School (OCS). But it was not at OCS. It was at the Aviation Cadet School at Lackland Air Force Base. Next was primary training for six months conducted, at that time, by civilian contractors. My instructor pilot was a WWII P-47 pilot, so I wanted to be a fighter pilot. The final phase was six months of basic, conducted by military instructors. On completion we graduated as a pilot and as a second lieutenant in the Air Force Reserve, with a

three-year obligation from the day of graduation. That added to my original three-year obligation but seemed worthwhile. I spent the first seven years as an instructor pilot in pilot training, instructor school, and then at Headquarters, Air Training Command on the standardization evaluation team checking on the competence of flight instructors. At the time I graduated from pilot training, I had one of the three fighter slots for the whole class, because they were graduating far, far more pilots than they needed.

BOB SHELDON: How many were in the graduating class?

LARRY WELCH: The graduating class at my location was 120 and the program had about a thousand. But, before I made it to the expected fighter assignment, Air Training Command came down with a decision to send the top eight graduates from each location to basic instructor school to become instructor pilots. Before that, all instructor pilots had to have operational experience. But there was a shortage of instructors, so this was a solution. It also seemed that somebody in authority believed that people who just came out of pilot training might do as well as instructors as pilots who had been off flying fighters or bombers or other aircraft. As it turned out, we did fine.

After I'd been instructing for about three years, I went to Craig Air Force Base to become an instructor in the basic instructor school—teaching people to be instructors. We also had the jet qualification course where, as a first lieutenant, I was teaching colonels how to fly jet airplanes. In that era, most of our senior pilots' experience was in props. The jets were the F-80, T-33, F-84, and F-86.

BOB SHELDON: Did you have any near-death experiences with your students?

LARRY WELCH: No. I never did. Like all instructors, I had students who seemed to be trying to kill me, but they never came close. I had a couple of flameouts (jet engine failures), but we handled those. Then they decided to do some reorganizing, and did away with the subordinate air forces in Air Training Command—Flying Training Air Force, Crew Training Air Force, and Technical Training Air Force, consolidating Flying Training and Technical Training at Air Training Command Headquarters and splitting up crew training and sending it to the operational commands. So they moved the former Flying Training Air Force Standardization Evaluation Board duties to the Basic Instructor School Standardization Evaluation Board at Craig Air Force Base. By that time I was serving on that board, so as a very junior first lieutenant, I became a member of a team that traveled to all the pilot training bases to evaluate instructor competence and the overall pilot training program. That was a challenging experience for a lieutenant.

Then one day just before New Years my two-star boss's office called and said to come in and meet with the General. When I reported to him, he said, "Look Welch, I just can't have lieutenants any longer running around telling lieutenant colonels and colonels how to run their business." So he said, "Step up here and I'll fix that." And he pinned on captain's bars—no waiting list, no formality. He just pinned them on. I had absolutely no idea I was eligible for promotion since it was a new program called below-the-zone promotion. Only a small percent of lieutenants with four years' service could be selected for immediate promotion to captain.

I have a little anecdote about that I still enjoy. After I got home, I wandered around the house with the captain bars on. Eunice asked, "Well, how was your meeting?" I said, "It was really good." And she asked, "Well, are we still going downtown?" I said, "Yeah." She said, "Well, are you going to change clothes?" I said, "Not yet." And she said, "Why not?" I said, "Not yet." I walked around a while, and finally she said, "When are we going downtown?" I said, "As soon as you notice something." She finally noticed. That was great fun.

I put in a request every year to go to fighters. And every year my colonel or brigadier general boss, whichever it happened to be, would say, "Not yet." And so finally after seven years in training command, with the Berlin crisis in play, the Air Force was forming a new conventional-only wing in Europe. At that time, the existing fighter wings in Europe were focused on nuclear weapons delivery. So to form the new wing they took some people from other wings in Europe and shipped over some new people from the CONUS [Continental United States]. It was the 366th Tactical Fighter Wing in France. We were building this wing from scratch, one squadron on each of four dispersed bases in France. On reporting to the wing Deputy Commander for Operations, he said, "I understand you've been flying T-38s." I'd been in a test force for the T-38—the new basic trainer aircraft as it was introduced to Air

Training Command. And I said, "That's right, sir." He said, "Well, we don't have any of those." I said, "I can fly anything, sir." He said, "Well, okay, maybe you can. But," he said, "what I need for you to do first is to build the COC (Combat Operations Center). And when you do that and we pass the NATO tactical evaluation in six months, you can pick your squadron." So I was assigned to COC. He had also just reported to the wing, from Air Defense Command, with no European fighter experience. I asked him, "What is a COC?" He said, "It's behind that door. Now you know as much as I do." I walked in the door and found a nearly empty room with a senior master sergeant, a field phone, and a field desk. Six months later the COC was operating with all the communications, desks, and status boards to control the generation of forces at four bases. We passed the NATO Tac Eval with flying colors. So I went back in and reported to the Colonel. He said, "It's a waste of your time to go down to one of those squadrons. I want to give you a new job here. I have this major staff position open, and I need you to do that." It looked like a great career move, but I said, "Sir, I think we had a bargain." He said, "I'll stick by the bargain, if you're dumb enough to insist on it." I said, "I really am."

So I went down to the squadron, and two months later the whole wing left because President De Gaulle essentially forced us out, as we were the last combat unit in France.

BOB SHELDON: What year was that?

LARRY WELCH: That would be 1963. Military aircraft flying at 20,000 feet or below operated under military control in France. That expedited flight to ranges, et cetera. But then it was dropped to 15,000, and then 10,000 feet, and then ground level, which meant we had to get clearance from France Control to even take off. That just didn't happen. So the Air Force picked the whole wing up from our four bases in France and moved us door-to-door to Holloman Air Force Base in New Mexico. And we moved four days after we were notified. When we got to Holloman, we had to build the wing from scratch. No real facilities—just temporary accommodations to put us down. We had just gotten established in a small building and started operating from it, when my squadron commander got a call from the Wing DO's office saying, "We are going to have to build a Combat Operations Center from scratch here and Welch knows how to do that, so send him up here to do that." My squadron commander knew about the deal in France, and he said, "Don't go." I said, "What do you mean?" He said, "Don't go up there. Just stay down here and keep flying." So I did. I just stayed down there and kept flying. And the Wing kept calling down and saying, "Where's Welch?" And they'd say, "Well, he's flying right now."

BOB SHELDON: What aircraft were you flying then?

LARRY WELCH: F-84s. We were the last F-84 wing in the Air Force. And after a while, a senior captain who started before I did said, "I'd like to go up and be Chief of COC." So the squadron commander told him, "Go on. Go do that." So I disobeyed the order, stayed in the squadron and deployed a lot, doing things fighter pilots do. Shortly after that, we failed an Operational Readiness Inspection (ORI) due to poor strafe (air-ground gun attack) performance. To fix the problem, the Wing formed a special team led by the 390th Operations Officer. I was on that special team. The relationship with that commander would come back to me in a few years. Shortly after we passed the re-evaluation with flying colors, the Wing Commander called me on the phone and said, "Congratulations, Larry," and I said, "Well, thank you sir, what'd I do?" He said, "You're on the Major's list." And I said, "No, sir, I'm not eligible." And he read my service number and asked, "Is that you?" And I said, "Yes." He said, "Well, you're on the list," and I said, "There's got to be some mistake." He said, "Well, if it's a mistake, too bad for them because you're on the list." Turned out it was a new program—deep below the zone. And so I was promoted to major four years before I had any expectation of promotion.

The next big challenge was converting to the F-4. Our first deployment was to be 120-day rotations to Alaska to provide the capability to reach western Alaska to intercept Soviet Bear bombers that were probing Alaska defenses. We converted, and had to pass an Operational Readiness Inspection to make the deployment a week after the ORI. But during the ORI, the Squadron Commander had a heart attack.

BOB SHELDON: How many years did you have in at that point?

LARRY WELCH: Eight years. After the Squadron Commander had a heart attack the operations officer moved up to Squadron Commander because we were deploying to Alaska in three days. And I was now the next senior

guy in the squadron. So I became the operations officer and we deployed to Alaska. We were supposed to be there for four months. But after six weeks, we got direction to take our airplanes to Hill Air Force Base to get them painted in camouflage colors because in two weeks we were deploying to Vietnam. So we deployed to Vietnam and I served the standard Vietnam tour. When I returned from Vietnam, I went to Armed Forces Staff College.

BOB SHELDON: What kind of missions did you fly in Vietnam?

LARRY WELCH: I flew a mix of North and South.

BOB SHELDON: Air-to-air? Air-to-ground?

LARRY WELCH: Air-to-ground. We flew F-4Cs. Over time, the squadron flew about half in the North and half in the South. Actually we flew a lot more missions in the South. We initially deployed to Phan Rang, where we were the only squadron operating off an expeditionary runway. We flew in-country missions from Phan Rang. After five months we moved up to Danang, where we flew both in-country and missions over the North.

BOB SHELDON: Was the F-4 relatively new in Vietnam when you flew it?

LARRY WELCH: We were the second F-4 wing in the Air Force. We went from being the oldest F-84 wing to the second newest F-4 wing. We had nothing but dumb bombs, 500-pound Mark 82s, and 750-pound M-117s.

BOB SHELDON: Was a hundred missions standard back then?

LARRY WELCH: The tour was either a hundred missions in the North or a year in the South. I had a mix of both so I completed a one-year tour. At the end of a year, I went to Armed Forces Staff College, which at that time was a five and a half month intermediate school. It was a very good experience. On completing the course, we expected to get a lot to say about our next assignment. But when the assignment people talked to me, they said, "You're going to Air Force Studies and Analysis." And I said, "Well, this has to be a mistake. The only analysis I know anything about is when you go to the hospital and provide a sample in a bottle." And he said, "No, you have been requested *by name* by Air Force Studies and Analysis, and they get whoever they want."

BOB SHELDON: Who made that request?

LARRY WELCH: It was the 390th Squadron Commander that I had mentioned before. He was in Air Force Studies and Analysis (AFSA), where he belonged since he was well suited for that. I mentioned earlier that he led the Wing Team that was formed when we failed our first ORI at Holloman. As a part of that team, I looked at the way we were harmonizing the guns and concluded that it was wrong. The maintenance officer declared emphatically that I was wrong and showed me the tech order on harmonizing the guns. I was still convinced it was wrong, so I calculated a new approach and explained it to the team leader and then to the Wing DO. The DO said, "OK Welch, we'll try it your way." That may not sound earth shaking, but here was a colonel who hoped to be a wing commander some day and who is personally responsible for getting ready to pass the ORI when another failure would mean both he and the wing commander would be out of a job. Some young captain tells him the tech data is wrong and explains why, and the Colonel has the guts to say, "Lets do it." I was very lucky to encounter that kind of leadership.

So we put together a harmonization range and adjusted all the guns. Strafe scores improved dramatically, and then when the ORI retake came along, lady luck appeared yet again. The ORI rules required that half the pilots perform the strafe event and half of those achieve qualifying scores. Based on the most recent record, the Wing Commander decided the 389th would go first. And though I was still a junior captain, I led the first flight to the range. We hit the range at 5:30 in the morning, just daylight, and the air was smooth as a baby's butt. There was not a hint of turbulence. The airplane slid down that strafe path without a wobble and the guns were properly harmonized. So my flight of four came off the range knowing we'd all shot at least 50% hits. 25% is what it takes to qualify. The second flight of the 389th came off with high scores as well. Anyway, my squadron sent sixteen airplanes across the range, and fifteen of them qualified. That's half of what the wing had to have. So at the end of that ORI, we had 82% of the pilots qualifying strafe—which was unheard of in the F-84. So that's part of what impressed this Lieutenant Colonel that pulled me, against my will, to Air Force Studies and Analysis.

JIM BEXFIELD: You had gotten more college in the meantime, had you not?

LARRY WELCH: I went to night school virtually constantly—in France, in Texas, in New Mexico, in Maryland, and so on. When I finally earned my undergraduate degree I had 170 credits, had served as the Chief of the Fighter Division, and had just been promoted to colonel. I had three years towards engineering with lots of math and lots of science.

I was told later by a lieutenant colonel in Air Force Personnel that, when I was selected below the zone for major, there were four people on the below-the-zone list that did not have an undergraduate degree. General LeMay scratched three of them off the list. The reason he didn't scratch me off is that virtually every evaluation report (ER) in my file said something about going to night school to earn a degree.

When I arrived at Studies and Analysis, I went to the Fighter Division. And the first subject that came up was a technical subject. I'd only been there a week and I did a paper on it, and gave the paper to my boss, who was a lieutenant colonel. He gave it to the Division Chief, a colonel who sent it up to the two-star and the two-star called me up.

BOB SHELDON: This is General Kent?

LARRY WELCH: No, it wasn't Kent yet. It was Major General Davis. He asked, "Where'd you learn all this?" And I said, "Just stuff that fighter pilots know, sir." And he said, "Doesn't look like fighter pilot knowledge." And I said, "Well, it is." He said, "Maybe so, but not all fighter pilots can write like that, so now you are revealed."

BOB SHELDON: What was the subject of that paper?

LARRY WELCH: It had to do with putting a set of sensors in the nose of an airplane, and I pointed out all the reasons why it was a really lousy idea. Wrong environment, et cetera. And so they sent that on up to the Air Force Vice Chief, and the Vice Chief said, "Okay, we won't do that." It was just a happenstance. It was a subject I thoroughly understood. I knew how to write. It was a decision that had to be made very quickly, but other people in the Division didn't have any idea how to address the subject. And this young major, new to the job, gives them a paper that lets everybody off the hook. It could have been a thousand other subjects and I wouldn't have had a clue. So, once again, luck played a powerful role.

BOB SHELDON: You were a little surprised at being assigned to Studies and Analysis. Did you have a preferred assignment?

LARRY WELCH: Oh, yes. At the time, I'm a major and a fighter pilot who just finished a tour in Vietnam. I expect to go back to fighter business and probably back to Vietnam. That's what was supposed to happen to young majors who are fighter pilots.

BOB SHELDON: Flying was your first love?

LARRY WELCH: Sure. I worked long and hard to get into fighters. But the new assignment was clearly the right one and had a lot to do with defining my future. The air-to-air branch of the Fighter Division was assigned the task of creating a simulation to evaluate design parameters in fighter airplanes. The core idea was to design for dogfighting because that was thought to be the most demanding set of design parameters. And some analyst at North American came up with the concept to simulate the fighter pilot decision processes and mechanize those decision processes to evaluate design parameters using one-on-one dogfights to build trade-off curves. The project wasn't getting anywhere, so they decided to bring in a couple of fighter pilots who could explain to the computer programmers how fighter pilots make decisions in air-to-air combat. I found out then that was why I was there. The Lieutenant Colonel had asked for me because he thought I could explain fighter tactics to computer programmers. Turned out he was wrong. I don't think anyone could. We tried that for about three weeks and I decided it just was not going to work.

So I sat down with a Fortran 4 self-taught course and figured out how to program a computer. Then we figured out how to tell the computer what to do. We moved a three-dimensional aim point in front of the airplane around, relating it to the three-dimensional aim point of the opposing airplane using a set of Monte Carlo decision rules.

We went to the Fighter Weapons School at Nellis Air Force Base and gave a quiz to a set of fighter weapons instructors. We asked, "If you have this condition, described in terms of position and overtake, what would you do?" And from that, we constructed a table of maneuvers for each set of relative conditions between aircraft.

Eight months later, after truly 15-hour days, taking only Christmas and New Year's off, we delivered a program where two F-4s would produce believable curves. We were able to validate with two airplanes at Eglin Air

Force Base. We configured one at lightweight with full power available. For the other aircraft, we restricted the afterburner to vary thrust-to-weight ratio and varied the weight to adjust wing loading. And we duplicated an appropriate set of curves from the simulation. So that gave the model enough credibility to use it to define the best set of design parameters.

But then we put in the data for new design airplanes. We put in an FX airplane, and the results were just garbage. The tactics and the decision processes that worked for the F-4, when used with what became the F-15, were just garbage. We discovered that we didn't know how to use an airplane that could pump energy out of the fuel tanks as fast as you could use it. Hence, for example, where the F-4 needed to do a high-speed yo-yo, the F-15 pilot could just pull back and turn a square corner and still sustain maneuver energy.

So we then used the simulation to learn F-15 tactics. By the way, there weren't any plotters in those days. We would scan down the columns of numbers in huge printouts—looking at angle off, closure rates, et cetera. We had to build a picture in our heads. I used to go home at night feeling like my brain had been twisted. We had top priority in the computer center—all the computer time we needed. The curves produced from the simulation indicated that the most cost-effective F-15 would weigh 40,000 pounds, have a wing loading of 65 and a thrust-to-weight ratio of 1.2. The F-15A that was delivered weighed 39,500 pounds, had a wing loading of 66, and a thrust-to-weight ratio of 1.15.

BOB SHELDON: This is was the days of punch cards too?

LARRY WELCH: Yes. We had two 5,000-card boxes that we carried to the computer center. And remember program line numbers are not sequential in Fortran 4, so if you drop a box of punch cards, you're in deep kimchi. We did.

Then we did the F-16. A different set of parameters. The simulation output said the F-16 should have a wing loading of 65 and a thrust-to-weight ratio of 1.35. The model was called Tac Avenger at that time. I believe Air Force analysis still uses a modern son of Tac Avenger (part of Brawler). An interesting aspect of the experience of building the simulation was the need to use the computer simulation to learn about the tactics for new airplanes, while the tactics for new airplanes taught us how to do the decision process. So this closed loop iteration—between learning tactics from the computer and teaching the computer from the tactics—produced a new way of thinking.

BOB SHELDON: Is this a predecessor model to Tac Brawler?

LARRY WELCH: Yes. I believe it's still a piece of Tac Brawler.

JIM BEXFIELD: Was there an issue having to do with the afterburner on the F-15? In other words, how fast it needed to go?

LARRY WELCH: That was the top speed issue—a big top speed issue. The Vice Chief of Staff of the Air Force was a fighter pilot's fighter pilot. He believed in high speed. He said, "Look, the Foxbat does Mach 2.7 and you say this airplane only has to do 2.5. I don't believe 2.5 is as good as 2.7." So we had to do a lot of analysis for the Vice Chief and show him how a 2.5 airplane could defeat an airplane designed for 2.7—the Foxbat. Then we showed him the challenge of going from 2.5 to 2.7. A Mach 2.5 airframe can be aluminum. For 2.7, it has to be stainless steel or titanium.

And we showed him the cost both in dollars and weight and maneuvering performance of having to do the trade-offs going to stainless steel and titanium. So he finally said, "Well, Welch," by then I was a lieutenant colonel, "I think you're full of crap, but I can't prove it, and I can't take the risk, so we're going to go with 2.5." After that there were several other opportunities to help with a problem facing the Vice Chief.

The conventional wisdom was that General Meyer never smiled. I saw him almost smile one time. We got into the big controversy about the lightweight fighter. Air Force Studies and Analysis handled the job of advocacy for the F-15 after we did the analysis because General Ryan was disappointed with the performance of the Advanced Concepts Division under the Assistant Chief of Staff for Research and Development (RDQ). We were in trouble on the Hill, and RDQ didn't seem to be able to deal with it. So General Ryan gave that job to General Glenn Kent, and General Kent gave it to the Fighter Division. By now I'm the Chief of the Fighter Division even though I'm just a lieutenant colonel. And so we had that particular task, and at the same time we had done some analysis that said there's no way we'd ever be able to replace all of the F-4s with F-15s. Too many F-4s and F-15s were going to be too expensive. From that, the idea of high-low mix was born with a

lightweight fighter as the low part of the mix—which became the F-16. A kind of a fighter pilot mafia developed to promote the lightweight fighter. It included a couple of us in Studies and Analysis, a couple of guys in RDQ, and a colonel from the Deputy Chief of Staff for Operations (XO). So we did the analysis and finally got a brief to a brigadier general in XO. And he said, "I think you guys are right. We've got to take this on up." Then we got it to a two-star. When he said, "I agree with you," we put his name on it and we got it to a three-star. And the three-star, the Deputy Chief of Staff for Research and Development, went through the ceiling. He said, "You're undermining the F-15. You're saying we can use this lightweight airplane for part of the force. That undermines our plans for the F-15." And despite us being majors and lieutenant colonels, we knew that the three-star was dead wrong.

So we continued the fighter pilots' underground and by hook or crook got the briefing on the Chief's calendar. So as the big day arrives, General Kent is on leave, other members of the underground have indeed gone underground and Lieutenant Colonel Welch gets to stand up there with a 10 slide briefing facing a panel chaired by the Chief of Staff to deliver the message that we can't replace all these wings of F-4s with F-15s, and so we need a high-low mix.

On the third chart, General John D. Ryan stood up and said, "You are messing with the family jewels, Welch. Who told you to do this?" And I said, "Sir, nobody told me to do this. I'm the Chief of the Fighter Division. This is what I'm supposed to do." I thought he was ready to stomp out when J.C. Meyer took the cigar out of his mouth, looked up at the Chief, and said, "Chief, you know, Welch has briefed me a number of times, and he's not very good, but his briefings are short. And since we're here, maybe we ought to hear the rest of the briefing." So Ryan turned around and sat down, and we finished the ten slides. Then I was smart enough to quickly get out from behind the podium and sit down on the side, out of the line of fire.

Ryan looked at Meyer and said, "Do you agree with this?" And Meyer said, "I think it's dead-on, Chief. I think that's what you're going to have to do." And Ryan said, "How did we get this far down the path without knowing this?" And Meyer said, "Chief, I guess we just weren't ready to face up to it."

Anyway, as he was walking out, Ryan stopped in front of me with his nose about four inches from mine. And he said, "Why weren't we this smart a long time ago?" As J.C. Meyer came by, it was the only time I ever saw from him what looked like it might have been a smile. As I'm walking down the hall, General Ryan's exec stops me in the hall and says, "He wants to see you." And I thought, "Oh, crap, here it comes." I thought I'd survived and here it comes.

So I go into General Ryan's office—he's a very brusque guy—tending to talk in machine gun bursts. So I walked in his office, and he said, "Sit down, Welch." So I sat down. And he went to a small cabinet, which by the way was still there when I became Chief, and a bottle of whiskey was still in it. Anyway, he poured a shot glass full, brought it over, put it on the table, and said, "Drink it. You need it." And I did, and he said, "Go back to work." That was a message that I understood clearly and appreciated for the rest of my military career.

Anyway, my point is that in all of these things I happened to be in places, time after time, when there was some really urgent need to do something that was very different. And it just happened to fit. So then I was supposed to go to some college, Air University I guess. And General Kent told me I couldn't go. So I went from a three-year tour to a four-year tour, to a five-year tour. And finally when I was promoted to colonel, he released me to go to the National War College. I was class of '71. Coming out of National War College was the one time when a colonel has a lot to say about where he or she goes.

JIM BEXFIELD: Before you go on, would you talk about your relationship with Glenn Kent?

LARRY WELCH: There's only one General Glenn Kent. My first experience with him was explaining the plan to create Tac Avenger. At that time he was not the head of AFSA. He was the Assistant Chief of Staff (ACS) of something at Systems Command. He was also dual-hatted in an R&D job in the Pentagon.

So he came over to hear a briefing on our approach. He knew he was going to be the ASC Studies and Analysis. I didn't. He came over for the briefing because we were doing it for Systems Command. And, for what seemed like a long time during the briefing, I find I am just not getting through to him—he keeps stopping me when I would refer to a situation as "a

barrel roll situation" or "a high-speed yo-yo situation." I put up a chart that showed the situations and then the Monte Carlo approach to the pilot's decision process. He would say, "Can't be a barrel roll situation. The guy's doing a high speed yo-yo." We got hung up on that for thirty minutes. He wouldn't turn loose of it. He understood, but he wouldn't turn loose of it. And finally I took the slide and a marker and changed all those definitions to A, B, C, D, E, F, G. He laughed and said, "You finally got the message." His point, which I never forgot, was that logic extends to language and the briefer's job is not just to convey the briefer's understanding. It is to provide understanding to those being briefed. Anyway, that was my first experience with him but certainly not the last.

He had this new concept in mind, a sort of master air warfare model. The task of bringing together this overall warfare model fell to Leon Goodson to work on. At that time I was still in the air-to-air group. And then when the Colonel who ran the Fighter Division left, he appointed me as the Chief of the Fighter Division, and his expectations just went up and up and up. But he was always perfectly willing to work the problem with you. General Kent didn't just say what many other general officers had to say, "I don't understand that. I don't think that's good enough. That won't sell." He would sit down and tell you what was wrong with it. He couldn't always tell you how to solve it, but he told you what was wrong with it. So I really enjoyed working for Glenn Kent, but he probably is the second-most demanding boss I ever had.

BOB SHELDON: Who was the first?

LARRY WELCH: The first was General Bill Creech. That was much later. Bill Creech was perhaps the politest, nicest boss you could have, but also the most demanding. Demanding the most in the way of analytical thought and results. And General Kent was a gamer. He would almost rather game you into something than just have you agree with him. I had a long-standing goal of getting a briefing through Glenn Kent without him changing it. I once took him a three-slide presentation that did what it needed to do, and that was as austere as possible, which is what he liked. He didn't like anything extra on a slide. He wanted everything on that slide to convey information. So I took this precise, carefully constructed three-slide presentation to him. He made 17 changes on three slides. But he had a wonderful way to live simultaneously with reality and with very high integrity that allowed his people to work in an unfettered way. No one else could tell us how to do a study. No one could tell us anything about our results, but they did get to decide what they did with it. So it wasn't even a compromise. It was a way to allow people to work with very high integrity and maintain support for them across the whole enterprise. With this approach, leaders did not have to worry about being sandbagged by Air Force Studies and Analysis, because they owned the results. In short, the customer gets to ask the questions and owns the results. The analysts get to provide the answers. So how it's used is a matter of the customer's conscience. So we produced a couple of studies that were really good that went on the shelf because they were very much contrary to the Air Force position of the time.

JIM BEXFIELD: Can you mention what those were?

LARRY WELCH: I can't remember them. They weren't that important, because we produced a lot of other studies that were contrary to the Air Force position that changed that Air Force position. That was a very active era for analysts. While I was in Fighter Division, we did underlying rationale and support studies on the F-15, the F-16, the A-10, the F-4G, the EF-111, and the AWACS. It may sound strange that AWACS is in that group, but that's where it was.

JIM BEXFIELD: As I recall, there were around two hundred and some people in Studies and Analysis, and probably about thirty in the Fighter Division?

LARRY WELCH: We had 37 analysts in Fighter Division in five study areas. There was the Air Superiority branch, which is where I was until I became Division Chief. There was also Close Air Support, Interdiction, Electronic Warfare, and Munitions. In addition, we had what we called the "fire drill team"—a small team of people who could go off to solve some immediate problem. And a bit later, we had Leon Goodson's branch doing the big picture analysis and simulation work. By the time I had left the Air Superiority branch, we had—and remember, this is before Power Point—two four-drawer filing cabinets full of slides. We could create about any briefing on any subject by adding maybe two or three new slides to those from the cabinet.

JIM BEXFIELD: You must have made extensive use of the graphics shop.

LARRY WELCH: That was another story. We had great graphics support but even so, at the time, it took a couple of days to get graphics done. At most places it took a couple of weeks. But as I said, we had unlimited computer time. We had the very first desktop cathode ray tube—monitor—capability in the Air Force. The first time I sat down at a GE-635 computer with a CRT, typed in the program, ran the program, and saw the results immediately on a monitor screen, I thought, "This is a miracle."

JIM BEXFIELD: When you left Studies and Analysis to go to National War College, did you feel like you wanted to do more work in the field of analysis?

LARRY WELCH: I realized, based on the time I had spent in Studies and Analysis, the value of an analytical group. But when the Colonels Group asked what I wanted to do, I said, "I want to be a Deputy Commander for Operations (DCO)." And they said, "What command?" I said, "I don't care." And they said, "What airplane?" I said, "I don't care." And they said, "What continent?" I said, "I don't care. I just want to be a Deputy Commander for Ops." So they gave me what I thought was the best DCO job in the Air Force—the DCO at George Air Force Base. At George, we had two operational F-4 squadrons, two U.S. Replacement Training Unit (RTU) training F-4 squadrons running crews through to get them to Vietnam, and two operational F-105G Wild-Weasel squadrons. So when I sat down in the DCO chair, I was dealing with five different models of airplanes—four models of the F-4 and the F-105G. We were also a jumping off point for squadrons deploying to Vietnam. So it was a complicated operation that couldn't be run by the seat of my pants. I formed a two-person analysis shop. Both members retired as general officers, so it worked for the wing and it worked for them. We applied analysis to all sorts of problems. But, like all great jobs, that came to an end as I was elevated to a necessary, but not great, job—Vice Wing Commander.

After about a year as Vice, General Dixon's secretary called and said, "Hold for General Dixon." At the time some people were frightened to death of General Dixon. He was known as the Tidewater Alligator. Dixon never started a phone call with "Hello" or ended it with "Good-bye." His entire conversation was, "Welch, I'll be at Cannon tomorrow. Mountain Home the next day. Meet me. Your choice." End of conversation. So I flew to Cannon. I was standing in front of the wing headquarters when the Wing Commander brought Dixon in from the flight line.

BOB SHELDON: Dixon was a four-star at this point?

LARRY WELCH: He was Commander of TAC [Tactical Air Command], and had just fired a two-star and a wing commander. But he walks up, punches me lightly in the ribs and says, "Let's go in and talk." Then he says, "No, wait a minute. Let's go listen to this damned briefing and then we'll talk." So he's being briefed on the many F-111 problems at Cannon, and every few minutes he would turn around and throw me a softball to respond to. I'd never met the guy. He had a terrible reputation, and here he was throwing me big softballs that only an idiot wouldn't know how to answer. So he was playing a game, which I didn't understand at all, and I wondered what happened to the alligator image.

When we were alone, he said, "Okay, Welch, here's the deal. I know that you told the 12th Air Force Commander that he's driving the wing off a cliff, and that the wing cannot continue to operate at that level, and if they don't back off, it's going to collapse. And I know he told you that if you don't have the kind of leadership at George that can handle that, he'd get some new leadership." I thought how in the hell does he know that? I knew the 12th Air Force Commander didn't tell him that. And he said, "Of course, I know you're right. And I know your wing commander can't do what he needs to do. And I know your numbered Air Force Commander doesn't know what he needs to do. So I have to get you out of there. I want you to come to TAC Headquarters to command the first F-15 wing. But I don't need you to do that until next year. So in the meantime, I want you to help me with some big problems that I need a Larry Welch to solve." And then I knew what was going on. He was a great admirer of Glenn Kent. So I said, "Sir, you've been talking to General Kent." And he looked at me and he said, "That's right." He said, "But I was DCS Personnel when you were in the Pentagon." He said, "So don't think that Glenn Kent's the first time I've known you." So the fact is that Dixon spent a lot of time going through personnel records of majors and lieutenant colonels looking for certain kinds of officers. This was mid

'74. But I was obligated to tell him, "Look, I have to tell you that I've got a strange EKG on my last physical. I have to go down to Brooks for a full evaluation." He said, "Well, should I worry about that?" I said, "I don't know." He said, "How are you feeling?" I said, "I feel great." He said, "Well, you look like you're in good shape. People tell me you have an enormous amount of energy, so we'll worry about that (the physical issue) when we need to."

So I went to work for him as a special assistant with an office next to his (though significantly more modest). He wanted me to form a small group to put together something he called integrated concepts of operation. So I put together a team, one of whom was Mike Ryan, John D. Ryan's son, that I called my Mission Impossible team, and it was. The purpose of these integrated concepts of operation was to explain to people how systems worked together. System of systems was not yet in analytical vogue but he understood that we needed to start thinking that way. The first integrated concept pulled together the F-4G Wild Weasel, EF-111 electronic jammer aircraft, the AWACS, and munitions to show the integrated approach to defense suppression. And we came up with a methodology and a way to portray this, and after some long Saturday morning sessions, he fell in love with the approach and the results. Eventually a lot of other people did too.

But then it came time for me to go to Brooks, and he called me into his office. He said, "What is this piece of paper about?" It was from Brooks and required that, as my supervisor, he provide his evaluation of me before the medical evaluation. So he said, "Don't you find this a strange process?" And I said, "Yes, sir, I certainly do." And he said, "Well, okay," and then he handed me a handwritten note and he said, "This is what I think I'll tell them. You look at that and tell me if you think that's alright." The note said, "Dear General . . ." (to the two-star at Brooks Medical Center), "While I find this a very strange process, I'm willing to participate. That said, so far as I can determine, Welch is healthy. He works harder than almost anyone else I know. He is certainly more productive than most anyone else I know. So if you discover that he's alright, that's great. If you find he's not alright, then I expect you to tell me what you need to do to make him alright." So when I got down to Brooks, my first appointment was with the Commander. He showed me the letter, not knowing I'd seen it. He said, "You've really got a champion there." And he said, "Now you know this is not going to make a bit of difference in your evaluation." And I said, "I didn't expect it would." But anyway, I came out of their evaluation in good shape. I just had a slightly different electrical system than was considered normal.

BOB SHELDON: Did they say in what respect it was different?

LARRY WELCH: The specifics are not very interesting and they really couldn't figure it all out, but I stayed with the treadmill until they got bored. Since then, the diagnostic capability has advanced to the point they can tell you more of the why and it presents no added risk. And I went back the second year. I was willing to do it because I understood they were building a database to be able to understand it, so the next time there's some young captain that has this condition, he doesn't get grounded. I believe that at the time, had they been able to detect those symptoms when I was a major, I would have been grounded. So I was willing to participate.

Anyway, my job with Dixon was pure analysis. Really hard, tough, conceptual, "how do you think about this?" As I said, "system-of-systems" wasn't even in the vernacular. As a piece of this, we invented a way to evaluate things using a double Delphi approach that was adopted as the basis of Checkmate's work. A lieutenant colonel working for me when I was the Deputy for Operational Plans (XP) dreamed it up, or at least how to apply it to this class of analytical problem, and then a small team exploited it. So the XP organization at TAC was very much in the analysis business.

JIM BEXFIELD: You said that General Dixon said you had a lot of energy. What was your typical day like?

LARRY WELCH: Dixon was an interesting boss. I really liked Dixon—personally—though I avoided social relations with someone that senior to me. I just didn't play that game. And when he retired he complained to Eunice that I would never even drink a beer with him. But I liked him. I traveled with him a lot. And I watched him lose his temper, and I watched him behave in ways that I thought were totally unnecessary. But he was a good leader and he was 100% corporate Air Force. It was never about TAC. It was always about the Air Force. And he had a heart of gold. He really did.

I characterize Dixon as lots of bark and not much bite. I characterize Bill Creech as all bite

and no bark. And I worked for five years for Dixon in various capacities, and five years for Bill Creech. I worked *directly* for them and helped them solve complex problems. As planned, after a year with Dixon, I took the First Wing, then came back to work for Dixon, first as Inspector General and then Deputy for Plans (XP) when I was promoted to brigadier two years later.

BOB SHELDON: Let's talk about the First Wing. Did you use some of the knowledge you gained from doing the F-15 study in Studies and Analysis?

LARRY WELCH: Well, not at first. That's kind of entertaining because when I first went down there as Wing Commander there's this new airplane that has such high energy maneuverability, that it can melt you into the floorboards, so physical conditioning and physical stamina is really important. So I watched F-15 guys go from spending time at the bar at happy hour to going to the weight room and playing tennis because every mission was physically demanding. By this time, I'm a 36-year-old colonel. With these young sports, for the first six months, I could win the air-to-air encounters most of the time because I knew this airplane. My actual time in the airplane was about a hundred hours, but I had thousands of hours with this airplane in simulations. But after about six months, I noticed that I started losing. After a year, I decided I didn't want to play these games anymore. So from that standpoint, what the first Studies and Analysis experience really did was hone the mental processes. I wouldn't have done well in Studies and Analysis in the first place if I hadn't had some aptitude for that, but there was enormous growth from the experience. There is a set of expressions that I dislike. One is, "That sounds about right." I don't want to know what it sounds like. I want to know what it is, at least to the limit of our ability to know.

With General Creech we embarked on a new series of operational concepts, which led to new systems and new ways of fighting and operating. The LANTIRN (low-altitude navigation and targeting infrared night) box came out of one such analysis. By then I was TAC Deputy for Operations (DO) but my jobs seemed always to call for the analytical approach.

We did genuine gap analysis. When we started, I'd never heard the term—never heard the concept. We started with conceptual ideas about what kind of capability we needed and gap analysis to address needs. And then a superb partnership between General Creech and the commander of Air Force Systems Command, General Al Slay, produced remarkable progress in defining, programming, and delivering a more complete set of tactical air capabilities. General Slay would put a group of his XR guys to work with our people to find solutions to the gaps. That's how the LANTIRN box came to be. Compass Call came from a gap analysis. The issue was how to dismantle the Warsaw Pact integrated air defense so that we could penetrate and do what we needed to do? That need is also what led to the F-117. Our initial interest in the 117 was to take out the SA-5s. We had to have something that could get in there and use area munitions to wipe out those SA-5s before we could get the attack aircraft through. So all of those systems came from gap analysis. They came from a partnership with Systems Command. We also had a long-range strike program. That led to the F-15E. The need was for true *all-weather* precision strike. The answer was the F-15E. And again, that came from that same partnership with Air Force Systems Command, which unfortunately doesn't exist any more and is sorely missed.

BOB SHELDON: What was your assignment after working for General Creech?

LARRY WELCH: While I was TAC/DO, the idea of a rapid deployment joint task force (RDJTF) took shape. President Carter decided that we needed a capability to respond in places where we didn't have a presence. Congress provided some funding and dictated the formation of the RDJTF, which later became Central Command (CENTCOM). They put an old War College classmate of mine in charge of the RDJTF (Marine Lieutenant General P.X. Kelly) and I became Commander of 9th Air Force. But my main assignment was to form the Rapid Deployment Air Force (RDAFFOR) component of the RDJTF. The only hope that RDJTF had of performing the assigned mission was to focus all the available air power on the situation, because the task was to stop a Russian invasion of Iran north of the Zagros Mountains. That was the 1002 plan, which evolved to the 1004 plan that was applied with some modification to Iraq in 1991.

JIM BEXFIELD: Same plan?

LARRY WELCH: Same basis. But instead of Iran it was Iraq. Instead of Russia in Iran, it was Iraq in Kuwait. So we had to build the RDAFFOR from scratch to support the RDJTF

mission of defending Iran from a Soviet invasion. We wrote the operations plan at 9th Air Force. It was a fascinating experience. At that time the 9th Air Force senior staff tended to be older colonels who were not competitive for promotion to general officer. But when they got the job of forming RDAFFOR and coming up with concepts of how to quickly respond with focused airpower, I found this group of colonels had done and could do almost anything and they thoroughly enjoyed it. They could run circles around the more prestigious TAC staff because they appreciated the opportunity to contribute. They played golf hard on the weekends. But the rest of the time they just worked. So we put together the plans to support the RDJTF. We invented "back yard" training capabilities so we could train realistically with the Navy and with the Army. We formed a special relationship with the Commander of the 24th Infantry Division at Fort Stewart to do joint training. He prepared an austere airfield, where we would operate A-10s in support of ground operations. The 9th AF tactical control people would operate in garrison, but connected so they could practice controlling air operations using our daily training flights. And we learned how to work together. The Commander of the 24th Infantry Division was Major General Jack Galvin, who eventually became SACEUR [Supreme Allied Commander, Europe]. We were full partners in our daily operations. And I knew Lieutenant General P.X. Kelly, Commander, RDJTF, well and we got along well, again in full partnership. The Army component commander was a corps commander. He didn't have much of a staff planning capability. The maritime commander was a one-star admiral out in Hawaii, Stan Arthur who later became full Admiral Stan Arthur. At the time, he had neither forces nor staff. The Marine Force (MARFOR) commander was a one-star out of Camp Pendleton, California.

So the formation of the RDJTF, which became CENTCOM, rested in P.X. Kelley's headquarters and my headquarters. We built the plans and capabilities from scratch—with new deployment concepts and new concepts for joint fires. The challenge was to stop the Russians with absolutely minimal friendly ground forces in place. That meant we had to attack the Russians in their most vulnerable area, which was in the northwestern mountain passes. To reach those areas, we needed B-52s. So we went to the Strategic Air Command (SAC) and got agreement that we could put some needed new munitions on the B-52s and operate them out of bases in Europe. Those concepts came from more gap analysis. Again, the gap analysis identified what was missing in capability to do what we needed to be able to do. Then it took partnerships to figure out how to do it. Fortunately we had a good relationship with the Strategic Air Command DO who had worked for me before. So when he took proposed solutions to his four-star boss, we got concurrence and action.

BOB SHELDON: At some point of time in the Air Force there was a lot of friction between SAC and TAC. Evidently you were able to overcome this?

LARRY WELCH: That pre-dated all of this. I don't know the history, but Dixon and Ellis (CINCSAC) were good friends. There were animosities elsewhere. TAC and MAC [Military Airlift Command] didn't get along well. So that meant that the MAC DO, who was an Armed Forces Staff College classmate, and I had to solve TAC-MAC problems that should have been addressed by our four-star bosses. General Moore retired a week before Dixon did. So the day that Dixon retired, the MAC DO and I signed a TAC-MAC document in their name that had been held up for a year. As far as I know, it's still in force. I believe the statute of limitations has expired on that confession. So relationships did make a lot of difference in getting things done.

I spent a couple of years at 9th AF then came back up to the Air Staff as the Deputy Chief of Staff (DCS) for Programs and Resources. The DCS Programs and Resources was responsible for putting together the Air Force POM—collecting all the inputs from the commands and putting the program together for the Chief and Secretary. And that's a complex job. How to value things and how to make things fit. How to think about cost effectiveness in a world that tended to know the cost of everything and the effectiveness of nothing—so lots of interface with OSD/PA&E [the Office of Program Analysis and Evaluation in the Office of the Secretary of Defense]. By the way, I was and am a believer in the PA&E function to include an adversarial relationship with the Services. Oftentimes there were people in PA&E that I was not fond of and they took positions that I thought were bad positions, but I thought that having an independent group of people improved our analysis. It motivated us

to do our homework. As a consequence, we understood our business much better than I think we otherwise would have. We challenged each other much more than we would have had we not had to deal with first OSD Systems Analysis and then OSD/PA&E.

JIM BEXFIELD: Now Studies and Analysis was under you at that point?

LARRY WELCH: No.

JIM BEXFIELD: It was still an independent organization reporting to the chief?

LARRY WELCH: Yes.

JIM BEXFIELD: Was it Jasper Welch who was in charge of it at that time?

LARRY WELCH: Jasper was later, but before Jasper, the character of Air Force Studies and Analysis changed to being more reluctant to challenge Air Force positions with analysis. When I moved from Programs and Resources to Vice Chief, I took on the task of restoring Air Force Studies and Analyses, though we could not build it back to what it was, but at least we—in my view—ensured that they returned to their heritage. And by then we were getting a lot better analysis from the commands, so we didn't quite need the power in a central studies and analysis that we needed when Glenn Kent was running it. This was in contrast to the kind of analysis we used to get from the commands. I remember when we took a matrix on the future fighter down to the TAC staff. We showed this matrix of capabilities, from a 25,000-pound day VFR [Visual Flight Rules] air-to-air only to an 81,000-pound all-weather, air-to-air, air-to-ground aircraft. Our analysis said that the 40,000-pound, all-weather, air-to-air machine with rudimentary air-to-ground capability was best. The TAC staff listened to the presentation and the TAC Deputy for Requirements (DR), who was supposed to be smart, said, "Well, we don't really need the briefing. I can look at that matrix and I can tell what airplane we want. We want that one in the upper right hand corner (81,000 pounds)." He said, "Good big airplane is better than a good little airplane." And Colonel John Boyd (typically irreverent) said, "No, No, General, that's not airplanes. That's football players." The DR stomped out of the room. We never gave the briefing to TAC. And the Air Force developed and fielded the 40,000-pound version.

By the way, years later, I made one of the early flights at Edwards Air Force Base in a new version of the F-15. My takeoff weight was 81,000 pounds—a fully loaded F-15E. So we ended up with some good big airplanes, but not until we had a lot of 40,000 pound airplanes that served for decades as the world's most capable air superiority fighter. And we also developed and fielded a lot of the low end of the matrix—aircraft weighing something less than 30,000 pounds—the F-16 family.

Initially the F-16 was day only. Day, night, clear air. Air-to-air and air-to-ground.

BOB SHELDON: John Boyd with his "energy fights," did he affect the Studies and Analysis arguments?

LARRY WELCH: Oh, yes. John and I worked together hand in glove for years on these issues. John was in RDQ. When the chief moved the FX analysis and advocacy task from RDQ to AFSA, we formed a 5-man team and I was the Studies and Analysis guy. The Brigadier General in charge was from RDQ. John Boyd was also RDQ and there were two guys from OPS. But John Boyd was deep into energy maneuverability analysis so he'd lay out all his plots and we were in total harmony on the F-15. John was the guy that had the task in Systems Command of defining the FX, and we gave a joint Boyd-Welch briefing more than 60 times. We were in harmony on the FX.

We were not in harmony on the lightweight fighter. John had become convinced that the lightweight fighter had to have a thrust-to-weight ratio of at least 1.6. And he was irritated because our analysis said that's a waste of money. We don't need it. We don't have an engine that can do that. We would have to develop another new engine, which was a very long, risky enterprise. As an example of the engine development challenge in those days, the reliability and maintainability of the early F-15 engines were terrible. Wonderful performance, but terrible durability. We were supposed to get 600 tactical cycles (idle to full power and back) out of the engine. We were getting 150 before having to do major overhaul. At one time, while I was 1st TFW commander, we had 140 airplanes on the ramp and 92 holes (missing engines). So I had no interest in creating an artificial need for a new engine. I knew if we had to put a new engine development in the F-16, it would delay that airplane another six years. And we needed it. We needed to replace those F-4s. We were spending a lot of money to maintain those F-4s. And we wanted to get the F-100s out of the Guard. We needed the high-low mix (F-15/F-16) soon. Anyway, we had a disagreement over that and we never really got

over it. John went on to analyze other things. He went on to land warfare. John was a great thinker. He did a great service to the Air Force.

But to get back in the time sequence, I went from DSC/Programs and Resources to the Vice Chief of Staff position. The Chief's plan was for General Jerry O'Malley down at TAC to take SAC when General Benny Davis retired, making Jerry O'Malley the logical candidate to be the next Chief of Staff. And I was to take TAC and spend the rest of my active duty at TAC, a prospect that made me happy. But then Jerry O'Malley was killed in a T-39 accident, along with his wife. The Chief and Secretary nominated three different people to Weinberger to take SAC. He turned them all down, and one day General Gabriel called me into his office and said, "Got good news. We've solved the problem of SAC." I said, 'Great. Who is it?" And he said, "It's you." I said, "Aw, come on." So I went to SAC—which turned out to be one of the best years of my Air Force career.

BOB SHELDON: Best year?

LARRY WELCH: Yes. I'll tell you why. When General LeMay, who chaired the board of the Air Force Aid Society, would come to Washington once a quarter, he would make a 30-minute appointment at noon with the Vice Chief. Thirty minutes precisely. Not with the Chief, but with the Vice Chief. He would give me advice for thirty minutes and he'd leave. Seventy percent of his advice was good and doable, which is a very high score. When it was announced that I was going to become CINC SAC, he asked for an hour. He went through a history of SAC. And he said, "Now Welch, here's my advice." He said, "When Tommy White sent me to take over SAC, he said, 'That command can't fly and they can't hit a bull in the ass with a baseball bat. You've got one year to turn that into a professional outfit. If you can't do it, I'll send somebody that can'." He said, "Ever since then, every time everybody goes to SAC, they act like they have that same set of conditions." He said, "Larry (he had never called me Larry before), I want you to put a stop to that. I want you to go out there and treat people in SAC like the great people they are, thorough professionals, doing a great job. There's no damn reason for SAC people to be miserable every damn day." I thought, who is this guy wearing this LeMay mask?

What he didn't know was that's what General Gabriel had told me. So I went out to SAC thinking that I would have to overcome a lot of staff opposition. But all I had to do was kick some obstacles out of the way, provide some resources, and let SAC run. For example, I asked an old friend, who was Commander 15th Air Force, to tell me about his most innovative, gutsy wing commander. He said it was the commander at Fairchild. The Mission Capable rate (MC) on the B-52 was 35%. On the tankers, it was 36%. A third of the airplanes are on alert, which are always MC. So something was badly wrong with the way we maintain big airplanes. So I told him, "Here's the deal. I waive *all* SAC regulations on maintenance and logistics. I waive all work force regulations on maintenance and logistics. You organize the way you want to organize. I will give you the money to put up some temporary facilities. The only caveat is that you have to spend a day at Tinker Air Force Base looking at how TAC maintains the AWACS. And then you do what you want to, and within five months I want to see 55% MC rates in the B-52s and the KC-135s in this wing." And he said, "Sir, sounds great."

Two months later, every wing in SAC, save one, had asked for the same dispensation. At the end of six months, every wing in SAC, save one, was above 55% MC rating on both the B-52 and the KC-135. Then we held a conference of wing commanders and deputies for maintenance at SAC and told them, "Now we know how to do this. You guys tell us what kind of directives we need to institutionalize what you've done to take care of this problem." The whole point is that there was so much dedication and so much talent at SAC, that had been so constrained by the culture of the nuclear mission, that the first thing I had to do was convince the two numbered Air Force commanders and then *all* the wing commanders to change. I told them they had to be schizophrenic. That is, if it had anything to do with nuclear weapons or nuclear systems the rule was zero innovation—zero defects—rigid adherence to checklists—no changes. We had a perfect record and we would keep it a perfect record. For everything else, I expected innovation, risks, and would accept mistakes. I told them, "The only way you can get in trouble on this is not being innovative. If you don't take risks, if you are so cautious that you don't make any mistakes, then you're going to be in trouble." They became convinced that we were serious about it. They transformed SAC in a year, doing what General Bill Creech's people did at TAC in four years. They were able to do it more

quickly partly because they had the model for the experience at TAC. They knew it could be done because they saw TAC do it.

I'll give you another anecdote about SAC people. I went to Grand Forks where the maintenance offices and shops were in a large hangar with terrible lighting and GSA temporary partitions. I told them we needed a first-class maintenance facility if we expected our people to be professionals—professional tools and professional environment to demand professional performance. I suggested that we "fix this hangar up." They said they had looked at it and the price tag was $5 million. I asked what it would cost to do it themselves. After a day of calculations, they said it would be about $650,000. I told them I would get them the money and would be back to see it when it was finished. They promised it in six months. I came back in four and a half months and walked into a totally transformed maintenance complex—walls, suspended ceilings, great shops, good lighting, and good heating.

As I walked in the hangar door, I was looking down a hall running the length of the hangar. The wall was perfectly straight—thoroughly professional. I asked, "How did you put this together in four and a half months?" The Deputy for Maintenance said, "Sir, some weekends we had 350 volunteers working out here." I asked, "With 350 people working, how did they get that wall so straight?" He said, "Sir, these are maintenance people." And, that was the SAC attitude. So that's why it was so great. You couldn't not love those dedicated people.

JIM BEXFIELD: As I recall, you had Hank Shinol doing some analysis work for you at SAC?

LARRY WELCH: Sure did. We had a good analysis shop at SAC. People with lots of experience who understood the problems and that were delighted to have these problems to work on. They'd kind of been ignored other than being asked to help with the SIOP (Single Integrated Operations Plan). I handed them a new and broader set of problems to help with, and they were responsive and very good.

BOB SHELDON: Was this your first time having to work with a SIOP, when you were at SAC?

LARRY WELCH: Yes.

BOB SHELDON: How did you find that process as compared to your TAC work?

LARRY WELCH: I looked at that SIOP process and asked, "Why don't we see if we can't move into the 20th century." They were doing things with strings on maps. In the same vein, the standard SAC training mission was eight hours. I asked why it needed to be eight hours. If it's eight hours that means a crew only gets to fly twice a month—maybe three times. They said, "Well, because" and ran out of thoughts about there. I told them I had finally figured it out. That's about how long it takes to fly to Moscow and they had to prove every month that their fanny was tough enough to fly to Moscow. So I mandated three-hour missions. The response was "Sir, you can't do the mission in three hours." I challenged them to tell me the base with the biggest issues with range locations?" And they told me it was Wurtsmith Air Force Base. So I went to Wurtsmith and flew a complete standardization evaluation mission with the wing stand-eval team, with the objective of doing it in three hours. I'd been to Castle and completed an abbreviated B-52 school by then. We did a full evaluation in two hours and forty-seven minutes and that included thirty minutes on the refueling boom—the toughest task for the pilot. So we went to three-hour missions and everybody jumped on board, declaring what a good idea it was. So now I said I wanted the crews to fly five times a month.

And then they said we couldn't do that because it takes a day to brief, and after the mission, it takes a day to debrief and then the crew spends three days on alert. I asked why it took a day to brief for a mission. The answer was that it takes that long to do the planning, produce the maps, and brief the flight. So we introduced some people to the marvels of computer-aided planning to reduce mission preparation time to no more than two hours, and mission debrief to be no more than two hours. Further, the goal was to go from computer aided planning directly to the airplane computer, and from the airplane computer to the debrief. Many were highly skeptical about computer-aided planning, but they figured it out and it worked.

BOB SHELDON: What happened there?

LARRY WELCH: They changed their attitude and expectation. It took some minimum software development and some very limited hardware development. I found the money for them and they got it done.

BOB SHELDON: So after SAC you became Chief?

LARRY WELCH: Yes, I went from the joys of being CINCSAC to the world of the Chief of

Staff of the Air Force—certainly a very different world.

BOB SHELDON: You spent almost four years there?

LARRY WELCH: It's a statutory four-year term. You serve four years or you get fired. Obviously being Chief is a great experience. You get to accomplish a lot, but there is a great difference from being a four-star field commander, particularly CINCSAC. One of the things I learned quickly in SAC was don't say, "I wonder if we ought to think about this," because the next day it'll be done. You really have to be sure people understand—I want you to go think about this, I want to have a meeting two days from now, then we'll decide whether this is a good idea. And then when they come in, you really have to make it clear you don't want to hear them say, "This is a good idea" because you suggested that it might be useful to think about it. So you have to start the meeting with something like, "Now if you tell me this is a good idea, you're really going to have to convince me this is a good idea. You're going to have to tell me why this is a good idea." And so you have to teach them that that's how you are. Because that isn't necessarily what they're used to. CINCSAC is very much the guy in charge in that world. Nobody outside Washington really argued with CINCSAC. In fact, the Congress didn't argue much with CINCSAC. After that, it is a bit of a cultural shock to come to Washington and become Chief of Staff of the Air Force, where there are dozens of people who argue with you. And when you think you've made a decision, that's a signal for a host of opposing worms to come out of the woodwork. So to be effective, the Chief has to be tough, persistent, and about some things, absolutely brutal. And the Chief also has to pick those things that he really is going to get done while he delegates other things to somebody else who has the time and is in a position to give it the needed attention.

For example, I decided that I was going to fix the officer evaluation system because it had become absolutely dysfunctional. I put *enormous* effort into doing that. The good news is that because I recruited a lot of very thoughtful people to help, the officer evaluation system we created is still in use and it still works. To do that, I formed three teams. One was a team of senior retired officers led by General Dixon. Another was a team of people from MPC (Military Personnel Center). We also formed a team of outside civilians and industry. They were told, "Here's the problem. Now you tell us the solution." So clearly, there are things a Chief can do that can't be done anywhere else.

But there are so many issues and there are so many people to convince, that you really don't go home every day saying, "Boy, this has been a good day." Sometimes you go home saying, "Well, I don't think I hurt anybody today." But in the end, when you look back on it, the test of your level of job satisfaction is whether you can say "Well, the Air Force is a lot better Air Force for your tenure." There is a lot you expected to get done that didn't happen. But if you left the Air Force better than you found it, and also you left behind a lineup of promising flag officers that you had every confidence would continue to make a better and better Air Force, that is probably enough. I thought I left behind a much, much more joint attitude than I found when I went there. I've always been very joint operations oriented. So all in all, being Chief was a satisfying experience, but I'll close that chapter with an anecdote.

For retirement as Chief, my preference would be to just say, "Bye folks," and walk out, but you can't do that. People would think you're mad about something. So you have to go through some kind of ceremony that includes a lot of people in the July sun, including troops at attention. Having done that, I know how much they appreciate that particular honor. It is hotter than hell, the troops are out there sweating, a bunch of airplanes fly by, and I was sitting there. By the way, they had Eunice sitting over at the side, off the platform. I decided that piece of protocol didn't begin to recognize her contribution to the Air Force, so I brought her and her chair to the platform beside me with the Secretary of Defense and Chairman of the Joint Chiefs. Anyway, I'm sitting there and there's some drill teams out there doing stuff, which never did excite me much. I started laughing under my breath, and Eunice whispered, "What's the matter with you?" Later, I told her I could hardly keep my composure because I suddenly had this vision. Instead of all the pomp, I had this vision of a giant screen on the field and a projector, projecting a tape of Martin Luther King saying, "Free at last. Free at last. Oh my God, free at last." And you know, that's sort of how I felt leaving the Chief's job. I wouldn't trade those four years for anything.

But I would not have wanted to serve four years and one day.

BOB SHELDON: You had a son at the Air Force Academy about that time. I was teaching math out there.

LARRY WELCH: He graduated from the Academy about the same time I graduated from the Air Force, and that was hard for him. Can you imagine being the Chief's son at the Air Force Academy?

JIM BEXFIELD: What's he doing now?

LARRY WELCH: He's an Air Force major. That was a learning and character building experience for him. Here's a kid who grew up as a general's son, with his friends' fathers wearing two and three stars. And he goes out to Colorado and finds out that a captain is God. Fortunately, he knew it when he went out there. He's a bright kid.

BOB SHELDON: What's his career field?

LARRY WELCH: Communications. He's an electrical engineer. He didn't have the eyes to be a pilot—he probably could have got a waiver if he'd been anybody but the Chief's son. But he loves his job. He loves the Air Force and has lots of very unusual experiences. He was the commander of a combat communications flight. He was the commander of the only Air Force unit in Haiti, the combat communications flight that supported the joint headquarters in Haiti. He was the leader of the technical team that put together the control communications and the control stuff to fly the Predator from Langley, Virginia. Many experts said it couldn't be done because of the latency problem. But combat comm people don't know "can't" and his colonel made certain that they had every opportunity to make it work and they did. So they can fly the Predator over Afghanistan and Iraq from the 5th floor of a building in Langley, Virginia.

JIM BEXFIELD: In terms of the role of analysis, are you seeing that changing over time?

LARRY WELCH: I think it's become much more widely understood. That is increasingly apparent from my current vantage point. Let me say just a bit about that. About a month before I finished my tour as Chief of Staff, I got what I thought was a strange phone call from the General Counsel saying there was someone who wanted to talk to me about a position after retirement. The General Counsel had advised that it's okay as long as you talk very carefully. I asked what it was about, and he said that the Chairman of the Board at the Institute for Defense Analyses wants to talk to you about becoming President of IDA. I laughed, thinking why would I want to be President of IDA? And I thought about it and I thought, well, I have to meet my own standard of conflict of interest. And although it'd be legal for me to go to work for the defense industry, I could never move from Chief of Staff to industry simply because there was no defense industry where I hadn't made decisions that affected it. So I decided I could not go to work for the defense industry. So then I thought, well, I'll talk to this guy. We had dinner three times, and I decided that for the next three or four years, that's what I wanted to do. So I agreed with the board that I would serve not less than three years. Thirteen years later, I didn't enjoy it any less than the first three years and my Board of Trustees remained highly supportive. But I decided it was time to take the opportunity to put a new person in the position, because thirteen years is long enough and because there were a couple of very attractive candidates that I thought we could recruit. And I also knew full well that there are things that are probably important that I was neglecting. So it is healthy to have a new leader after a while. So I stepped down as President so the Board could take the opportunity to choose the right successor.

JIM BEXFIELD: It seems like, as I've listened to you for a couple of hours, that the thing that really excites you is solving problems.

LARRY WELCH: Absolutely.

JIM BEXFIELD: And as long as you have a job that causes you to solve problems, you're going to enjoy life.

LARRY WELCH: I've had an astounding set of opportunities, starting with when I was a lieutenant. I was sent from Williams Air Force Base down to Laughlin Air Force Base because Laughlin had become a pilot training base instead of a gunnery base, while Williams became a gunnery base. So I had a new opportunity. Lieutenant Welch was tasked, as an additional duty, to re-do all the regulations from crew training to flying training. That pattern of new challenges repeated and escalated with each new assignment and each new rank. So it has been my lot and pleasure to be in positions to address new sets of challenges.

JIM BEXFIELD: You're still doing that at this point?

LARRY WELCH: Yes.

JIM BEXFIELD: Let me ask a MORS question. You've had a close relationship with MORS for at least the past decade. How would you view MORS' value to the military community?

LARRY WELCH: Well, obviously I had thought for a long time that MORS is very valuable—for at least three or four reasons. For one, there is the education mission. And it's a community builder. And it's facilitating analysis in its own right. Any time you have an organization that attracts a bunch of very bright analysts who work across a very wide range of issues in diverse locations for diverse motivations, it has to be of high value to the overall quality of analysis. I don't know any other approach that fills that role.

BOB SHELDON: What advice would you give a young analyst starting out?

LARRY WELCH: Take on the hard problem when you have the opportunity, and solve it. It's much, much better to take on something so hard you're not sure you can do it, than it is to play it safe. I guess the other advice, which is very hard for people who are bright enough to be really good analysts to take, is to learn to listen—you do your best thinking while listening. You do your poorest thinking while talking. I recall that on one occasion, at a going-away party for Jim Knight, the Vice Commander and a very quiet Texan, the emcee who knew us both well, joked that, "The definition of a quiet evening is dinner with Jim Knight and Larry Welch." I took that as a compliment.

JIM BEXFIELD: Your approach seems to be to listen to the briefing first, and then ask questions. As opposed to asking questions while the briefing's going on.

LARRY WELCH: I would rather let the briefer provide their understanding with minimum interruption. Then your response should be of real help. It doesn't help to tell hard-working people that their briefing needs fixing. A responsible leader needs to be able to help describe how to fix it. I still spend a lot of time doing that.

JIM BEXFIELD: I understand you used to take the slides and put them all over the table.

LARRY WELCH: That was my way to try to get an overview quickly.

JIM BEXFIELD: And then try to move them around and shuffle them up.

LARRY WELCH: I learned that from General Dixon before we used computers to create briefings. Dixon would take a paper on a complex matter and mark it up, and then he would lay it all out on the conference table in this conference room, and then we would walk around the conference room table and get a sense of the whole thing, and move things around until it made the most sense. Dixon was a great communicator. One thing you could be very sure of. When I was a brigadier, I took two or three briefcases home every night, had dinner with the family, usually a little late, and then sat in front of the fireplace to go through the briefcases. I knew that Dixon did the same. And I learned from him, never let the sun rise on your inbox. If you do, you're keeping someone on your staff from doing their work. So the sun set on my inbox, but never rose on it. A related, broader lesson from Dixon was to never let *you* be the reason people can't get their work done.

JIM BEXFIELD: That must have made for awfully long days and not too much sleep.

LARRY WELCH: Yes, it was okay. I didn't play golf.

BOB SHELDON: You said General Creech was more demanding than General Kent. In what respect?

LARRY WELCH: More demanding than General Dixon. Or than General Kent even, though it was close. General Creech had such very high standards. I remember when he first came down to HQ TAC, we had a set of canned briefings. We thought they were pretty good, but the Chief was coming the next day. Yes, the next day at ten o'clock. So we gave these dry runs to General Creech that afternoon, and it was clear that he didn't like them. I was still the XP. The DO is in charge of the whole thing. So General Creech takes one of my briefings and he said, "Okay, Welch. Listen. We're only going to have a couple of hours with the Chief. So I don't want to give him the scatter shot treatment. I want to focus on one thing. And here's what I want to focus on." And he laid down what he wanted to focus on. He said, "Now, I know it's going to be a lot of work to put that together," but he said, "I'd like to see it at eight o'clock in the morning." This is five o'clock in the afternoon. And I said, "Okay."

So I sat down with my mission impossible group and, having committed to memory everything he had said about what he wanted, we laid out a greatly expanded Flags programs. Dixon had initiated Red Flag and Green Flag, but General Creech had laid out this whole

series of flag programs that we would use to guide the evolution of tactical air power. And I was to create a briefing laying out all this for the Chief.

So at eight o'clock the next morning, he said, "You don't need to brief me, Larry. I know you're tired. Just flip through the slides, and then go rest for an hour, and be ready to talk to the Chief." So I flipped through them, and he said, "I think we are ready to fire for effect." He then had "a few little things" to fix, which meant changing virtually every slide. But it was easy to fix, since we then had the capability to quickly make slides. And so I stood up at ten o'clock and gave an hour and twenty-minute briefing to the Chief, playing back a lot of Creech's phrases. And General Creech didn't say a word, even expecting me to answer the Chief's questions even though he could have answered them much better.

Then there was a twenty-minute discussion mostly between General Creech and the Chief. So then Creech said, "Now, Chief, I need your approval to do the Checkered Flag, because it's going to cost some money." The Chief said, "Go for it." He said, "And Chief, I'll need your approval for Silver Flag, because it's going to cost some money." The Chief said, "Oh, not much. Go ahead and do it." So that was my first introduction to General Creech. And needless to say, we had a good relationship. But that event illustrated what he expected. He expected you to be able to take his guidance and turn it into action. That is what he demanded of you all the time.

JIM BEXFIELD: How about what he demanded of himself?

LARRY WELCH: He had to pace himself a bit. He had a heart condition. He didn't let it keep him from doing anything, but he couldn't afford to get too tired. But he was very, very efficient. So he could do a lot without working anything like the hours that I had to work to meet his expectations. I had only one job in the Air Force where if I'd had 10% less to do, I could have done everything 20% better. That was as TAC DO, working for General Creech. Most demanding job I had in the Air Force.

JIM BEXFIELD: I recall a situation when you were Chief, when you signed out a letter regarding the use of Tac Brawler in F-22 analysis. Any comments you'd like to make?

LARRY WELCH: It was, again, a solution. We put out requests for proposals (RFPs) and then tried to do an analysis for source selection. It was a black art. The contractors ran their own models and then, based on their models, declared what the system could do and what it would cost. So source selection was heavily dependent on deciding what and who to believe. So Joe Ralston, who at that time was down in RD, was my project guy on the F-22. He was a colonel or maybe a brigadier by then. So we sat down to address how to make source selection more orderly—how to pick what we really wanted. So Joe asked if there wasn't some standard model we could filter all the proposals through. So we picked Tac Brawler and required that each contractor provide a data deck for Tac Brawler. We informed the contractors that Tac Brawler would be the performance evaluation tool. We knew they would then try to game Tac Brawler but didn't care, since I was convinced that Tac Brawler would do a better job of giving us insights into the right stuff than any other approach available to us.

And that's how that came to pass. It was really Joe Ralston's idea. We operationalized it by telling industry that's what we're going to use to evaluate you. I'm sure that drove a lot of people crazy trying to understand the model, to figure out what it really measured.

JIM BEXFIELD: Any stories concerning Clayton Thomas that you might want to share?

LARRY WELCH: I don't have anything specific. Except several times when I was really stuck, Clayton was the difference between success and failure. After the early months, Kent never handed me a problem unless it was a tough problem. And there were several times when I just couldn't imagine how to get started. But if I could just get a thought on how to get started, we could usually figure out how to do it. And Clayton was great at that. I would tell him the problem, and he would ask a few questions, and suggest a couple of methodologies or a couple of approaches. And then I'd go back and think about it a little bit, figure out how to use one of the approaches, and off we'd go. I never failed to get the help from Clayton that I asked, and he never ever came around later and said, "Did you do what I advised you to do?" He was just totally ego-free. When you asked him for help, you got that help, and that was it. He didn't seek any credit. He didn't want you to come back and tell him how wonderful he was. He just did it. And I think he was the only

one in the strategic division that I had such a relationship with. He was an ops analyst in support of the strategic guy. I got started with him at some social gatherings early on. I don't remember the occasion, but he was standing alone doing something, and I went over and introduced myself and, in the course of the conversation, one of my current challenges came up and he said, "I have a thought or two on that. Why don't you come see me?" So I went to see him. And he did have a thought or two on it.

JIM BEXFIELD: He always had good thoughts.

LARRY WELCH: Yes.

JIM BEXFIELD: I notice you're affiliated with Homeland Security now. Are you providing some analytic insights on homeland security issues?

LARRY WELCH: I chair the advisory committee to the Homeland Security's Science and Technology Directorate. Science and Technology in Homeland Security is much broader than what you think of in DoD. It's more like AT&L—perhaps a kind of half an AT&L. The advisory committee looks at their programs and looks at the gap analysis, and gives them advice on how to get on with the job. We've only had two meetings. We have formed into panels. Homeland Security has lots of needs, and I hope we have enough ideas to give them some help. I have a good group of people on the committee, so I think it'll be useful. I didn't need that extra opportunity, by the way.